

REC'D 14 JUL 1993

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference E00305 MB/JB	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NO98/00043	International filing date (day/month/year) 06.02.1998	Priority date (day/month/year) 06.02.1997
International Patent Classification (IPC) or national classification and IPC ₆ C02F 3/00, C02F 3/02		
Applicant HIFO TECH A/S et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 04.09.1998	Date of completion of this report 30.06.1999
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Bo Bergström/MP Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NO98/00043

I Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☐ the international application as originally filed.

☒ the description, pages 1-10, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.

☒ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. 1-8, filed with the letter of 26.05.1999,
 Nos. _____, filed with the letter of _____.

☒ the drawings, sheets/fig 1-2, as originally filed,
 sheets/fig _____, filed with the demand
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-8</u>	YES
	Claims	<u></u>	NO
Inventive step (IS)	Claims	<u>2</u>	YES
	Claims	<u>1, 3-8</u>	NO
Industrial applicability (IA)	Claims	<u>1-8</u>	YES
	Claims	<u></u>	NO

2. Citations and explanations

1. EP, A1, 86587
2. Water Environment Research, 68(1996):1, p.83-93
3. EP, A1, 695720
4. US, A, 5599451

The invention according to the amended claims of September 7, 1998 concerns a method for removal of nitrogen and phosphorus from wastewater. This process takes place in a single-compartment bioreactor containing both aerobic and anaerobic microorganisms. Oxygen is added intermittently to the reactor by aeration. The oxygen concentration is fluctuated in cycles between values suitable for an aerobic process and values suitable for an anaerobic process. The fluctuation period is shorter than the time period required for the individual process steps to be completed. According to claim 1 the method is characterized in that each cycle is lasting for less than one hour.

Documents (1)-(3) show processes in single-compartment bioreactors, containing both aerobic and anaerobic microorganisms, for treating waste water.

.../...

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Document (1) (see p. 54, l. 28-35) shows as an example an aeration cycling period every hour. The process provides a "window" of dissolved oxygen concentration (p.55) within which substantive amounts of concomitant nitrification and "aerobic" denitrification can occur in the same sludge. By on/off cycling of the oxygen these processes are altered by anaerobic denitrification. This has the effect of providing a weighted average dissolved oxygen level, which is low enough to accomplish additional denitrification and yet still intermittently high enough to maintain effective performance of nitrifying microorganisms, cf. claim 1 of the present application. The "window" limits are in the interval 0.1 to 0.3 mg oxygen/l -1,5 to 2 mg/l, cf. also present claim 5. The dissolved oxygen concentration (p.57, l.1-7) can be controlled at a level to permit both nitrification and denitrification reactions to occur. Said conditions can be interpreted to imply that in the known process there is also no need for an acclimatisation period after the conditions in the reactor has returned to suitable conditions from less suitable conditions, as is intended in the present application.

Document (2) (see p.84, l. 6-11 and table 1) shows as an example an on-off cycle of oxygen, where each cycle is lasting for one hour.

The intended difference between claim 1 and documents (1) and (2) is the characterizing feature of "less than one hour". However, when cycling periods of down to one hour are known, the feature of "less than" is no feature of distinction. This can mean a few minutes below one hour, which would be obvious for a skilled person to try. Besides, the feature of "less than one hour" is not critical for the process according to the present description, p.3, l. 34-36.

Therefore claim 1 lacks an inventive step.

However, claim 2, comprising a well defined and delimited statement concerning the cycle period, is considered to involve an inventive step.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

According to document (3) nitrogen and phosphorus are removed by a process, in which parameters like temperature, redoxpotential, pH, dissolved oxygen and the concentrations of N-NO₃ and N-NH₄ are measured. The relationships between these parameters and the quality of the treated water are determined and by means of a computer are used for controlling the space of time for the different phases in the water treatment process by means of the different concentrations of oxygen. Thus, the addition of oxygen is controlled by the computer depending on the measured parameters.

Document (4) shows integrated aerobic/anaerobic biofilm means in a single-compartment bioreactor.

Claims 3-8 comprise features which are known per se from documents (1)- (4) or are obvious to a person skilled in the art. Therefore claims 3-8 lack an inventive step.

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VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The expressions "nitrogen and/or phosphorus" in claim 1 is obscure and must be exchanged for "nitrogen or nitrogen and phosphorus". The claimed invention refers to the idea that nitrogen or nitrogen together with phosphorus are removed from waste water. The method is not intended for removal of phosphorus solely.

The amendment of the word "conversion" to the expression "chemical conversion" in claim 1 is obscure. Further, this expression is not used in the application as originally filed.

Concerning amended claim 1, which formerly comprised two characterizing features, the first one is now moved to the introductory part, The second one (p.11, l. 13-14 in the claims of September 4, 1998) has been deleted in the amended claim 1, which makes the claim less clear.

26-05-1999

PCT/NO98/00043

AMENDED CLAIMS

1.

5 A method for control of biological nitrogen and/or phosphorus removal from waste water in a continuous flow one compartment bioreactor containing a plurality of different aerobic and anaerobic micro-organisms each able to perform at least one step in the chemical conversion necessary for the nitrogen and/or phosphorus removal, where the bioreactor is intermittently aerated to cause the oxygen concentration in the bioreactor to fluctuate in cycles between
10 values desirable for the aerobic processes and values desirable for the anaerobic processes in the conversion, c h a r a c t e r i s e d i n that each cycle is lasting for less than one hour.

2.

The method according to claim 1, c h a r a c t e r i s e d i n that each cycle is lasting for
15 less than 30 minutes, preferably less than 15 minutes.

3.

The method according to claim 1 or 2, c h a r a c t e r i s e d i n that the system undergoes at least four cycles per mean liquid detention time for the wastewater.
20

4.

A method according to one or more of the claims 1 to 3, c h a r a c t e r i s e d i n that the oxygen concentration is continuously monitored to determine the status and requirements of the process and that the reactor is aerated as a response to the status based on pre-set
25 (programmed) rules and predetermined process requirements.

5.

The method according to one or more of the claims 1 to 4, c h a r a c t e r i s e d i n that
30 the reactor is aerated when the oxygen concentration falls below a pre-set value that is set between 0 and 2 mg/l, preferably between 0,5 and 1,5 mg/l, and is stopped when the oxygen concentration is above pre-set value that is set between 2 and 7 mg/l, preferably between 1,5 and 6,5 mg/l.

26-05-1999

6.

The method according to one or more of the claims 1 to 4, c h a r a c t e r i s e d i n that the aeration is controlled by a timing device.

5 7.

The method according to one or more of the preceding claims, c h a r a c t e r i s e d i n the bioreactor is a biofilm bioreactor.

8.

10 The method according to one or more of the preceding claims, c h a r a c t e r i s e d i n the bioreactor is an activated sludge bioreactor.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 26 MAY 2000

WIPO

PCT

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Applicant's or agent's file reference	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NO99/00043	International filing date (day/month/year) 09.02.1999	Priority date (day/month/year) 09.02.1998
International Patent Classification (IPC) or national classification and IPC ₇ C 08 F 4/69, C 08 F 10/02		
Applicant Borealis A/S et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 25.08.1999	Date of completion of this report 18.05.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Helena Danielsson/Els Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NO99/00043

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☐ the international application as originally filed.
- ☒ the description, pages 1-29, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.
- ☒ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. 1-11, filed with the letter of 06.04.2000,
 Nos. _____, filed with the letter of _____.
- ☒ the drawings, sheets/fig _____, as originally filed,
 sheets/fig _____, filed with the demand
 sheets/fig _____, filed with the letter of _____,
 sheets/fig 1, filed with the letter of 06.07.1999.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NO99/00043

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-11</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-11</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-11</u>	YES
	Claims		NO

2. Citations and explanations

The claimed invention relates to a dual site catalyst for the polymerisation of ethylene or ethylene with α -olefins. The catalyst comprises a chromium oxide catalyst modified with a transition metal compound and a catalyst activator.

Amended claims 1-11 have been filed with the letter of 06.04.2000. The subject matter of the amended claim1 is restricted to a modified chromium catalyst comprising
a) a chromium oxide catalyst combined with an inorganic support
b) a transition metal compound that is a metallocene, and
c) an aluminoxane,
where said aluminoxane and transition metal compound are impregnated into said chromium oxide catalyst.

The invention is intended to solve the problem concerning the tendency of inactivation of the catalysts when both a chromium oxide and a metallocene catalyst are used in a single polymerisation reactor to obtain ethylene polymers having a controlled bimodal or broad molecular weight distribution.

The solution according to the invention is to provide a dual site catalyst combining the features of both chromium oxide and metallocene catalysts.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NO99/00043

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

The most relevant documents cited in the International Search Report were:

D1 EP 0339571
D2 EP 0733650

Document D1 discloses a catalyst prepared by bringing a chromium oxide on an inorganic support, a metallocene compound and an aluminoxane into contact with each other.

The catalyst in the claimed invention differs from the catalyst disclosed in D1 in that D1 does not mention the reduction of calcined chromium into a bivalent oxidation state. Further, this document does not make known that the metallocene compound and aluminoxane are impregnated into the catalyst support.

Document D2 relates to a solid catalyst for the (co) polymerisation of ethylene. The catalyst comprises a metallocene of a transition metal, an ionising agent and a chromium oxide. The chromium is calcined to a hexavalent oxidation state and then at least partially reduced to a bivalent state. The difference between the claimed invention and the catalyst disclosed in D2 is that according to D2 a boron compound is used as the catalyst activator. Further, D2 does not mention impregnation of the catalyst activator and the metallocene into the catalyst support.

In view of the above, the claimed invention is considered to fulfil the requirements of novelty, technical applicability and an inventive step.

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

13 October 1999 (13.10.99)

International application No.

PCT/NO99/00043

Applicant's or agent's file reference

64823-TH

International filing date (day/month/year)

09 February 1999 (09.02.99)

Priority date (day/month/year)

09 February 1998 (09.02.98)

Applicant

FOLLESTAD, Arild et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

25 August 1999 (25.08.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

A. Karkachi

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

TANDBERGS PATENTKONTOR AS
Boks 7085
N-0306 Oslo
NORVÈGE

Date of mailing (day/month/year) 16 August 2000 (16.08.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 64823-TH	
International application No. PCT/NO99/00043	International filing date (day/month/year) 09 February 1999 (09.02.99)

1. The following indications appeared on record concerning:

☒ the applicant
 ☐ the inventor
 ☐ the agent
 ☐ the common representative

Name and Address

BOREALIS A/S
Lyngby Hovedgade 96
DK-2800 Lyngby
Denmark

State of Nationality

DK

State of Residence

DK

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person
 ☐ the name
 ☐ the address
 ☐ the nationality
 ☐ the residence

Name and Address

BOREALIS TECHNOLOGY OY
P.O. Box 330
FIN-06101 Porvoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office
 ☐ the designated Offices concerned
☐ the International Searching Authority
 ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority
 ☐ other:
The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

S. De Michiel

Telephone No.: (41-22) 338.83.38

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 99/00043

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: C08F 4/69, C08F 10/02 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: C08F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0339571 A1 (SHOWA DENKO KABUSHIKI KAISHA), 2 November 1989 (02.11.89) --	1-2,4-6
X	EP 0733650 A1 (SOLVAY), 25 Sept 1996 (25.09.96), abstract, claims, page 4, line 52 - page 5, line 1 --	1,3-4
A	WO 9614154 A1 (MOBIL OIL CORPORATION), 17 May 1996 (17.05.96), page 8, lines 28-29 --	1-12
A	WO 9708213 A1 (BASF AKTIENGESSELLSCHAFT), 6 March 1997 (06.03.97) -- -----	1-12
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
11 May 1999		31 -05- 1999
Name and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Helena Danielsson Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

07/04/99

International application No.

PCT/NO 99/00043

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0339571 A1	02/11/89	DE 68913226 D,T JP 1272605 A JP 2640491 B JP 1292009 A JP 2678914 B	29/09/94 31/10/89 13/08/97 24/11/89 19/11/97
EP 0733650 A1	25/09/96	BE 1009186 A BR 9600991 A CA 2170805 A CN 1156729 A JP 8259618 A	03/12/96 30/12/97 14/09/96 13/08/97 08/10/96
WO 9614154 A1	17/05/96	AU 701536 B AU 3719895 A CA 2204265 A CN 1169122 A EP 0789624 A JP 10508630 T US 5614456 A	28/01/99 31/05/96 17/05/96 31/12/97 20/08/97 25/08/98 25/03/97
WO 9708213 A1	06/03/97	CA 2227248 A CN 1193984 A EP 0846131 A	06/03/97 23/09/98 10/06/98